REINZ-Dichtungs-GmbH

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Patent Claims

1. Bipolar plate for fuel cells which comprises at least a shaped, at least partially conductive foil, the bipolar plate having a channel structure formed by the shaping of the foil to convey reactants to electrodes of adjacent fuel cells and to carry away reaction products,
characterised in that
a microstructure (4) is integrated into the foil (1) to increase the rigidity of the foil (1).

2. Bipolar plate according to claim 1, **characterised in that** the microstructure (4) comprises hexagons, triangles or a combination of various polygons which are joined together covering the surface at least partially.

3. Bipolar plate according to claim 1 or 2, **characterised in that** the microstructure (4) and/or the channel structure (2) of the foil (1) is/are embossed or etched.

4. Bipolar plate according to one of claims 1 to 3, **characterised in that** the microstructure (4) has a typical length scale (11) of between 1µm and 500µm, preferably between 1µm and 100µm.

5. Bipolar plate according to one of claims 1 to 4, **characterised in that** the foil (1) has a thickness of less than 0.5 mm, preferably between 0.05 mm and 0.2 mm.

6. Bipolar plate according to one of claims 1 to 5, **characterised in that** the microstructured foil (1) has in the region of channel bases (5) of the channel structure

region of channel bases (5) of the channel structure (2) trough-like depressions (6) for draining away condensed reaction products.

7. Bipolar plate according to claim 6, **characterised in that** the trough-like depressions (6) are formed by recessed centres (7) of hexagons, triangles or polygons forming the microstructure (4).

8. Bipolar plate according to one of claims 1 to 7, **characterised in that** the foil (1), in the region of a contact surface (3) to an electrode or gas-diffusion layer of an adjacent fuel cell, has hydrophobic properties, preferably due to superimposing a substructure (9) on the microstructure (4), utilising the Lotus effect, to guarantee an improved gas transport of the reactants to the electrode or gas-diffusion layer by keeping the corresponding region free of fluid.

9. Bipolar plate according to claim 8, **characterised in that** the substructure (9) has a typical length scale (11) of between 0.1µm and 50µm, preferably between 0.1µm and 10µm.

10. Bipolar plate according to claim 8 or 9, **characterised in that** the substructure (9) is realised by a coating (8) applied to the foil (1).

11. Method of manufacturing a bipolar plate or a constituent part of a bipolar plate for fuel cells by embossing an at least partially conductive foil in such a way that a channel structure is produced for conveying reactants to electrodes of adjacent fuel cells and for carrying away reaction products, **characterised in that** the foil (1), to increase the rigidity of the foil (1), is provided in the

same embossing process with a microstructure (4) which preferably comprises hexagons, triangles or a combination of various polygons, by using an embossing tool with corresponding microstructuring of an embossing surface.